UNITED STATES MARINE CORPS
Basic Officer Course
The Basic School
Marine Corps Combat Development Command
Quantico, Virginia 22134-5019

B5705PT

INTRODUCTION TO NBC DEFENSE

PROGRAMMED TEXT

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INTRODUCTION

You are directed to read all sections of this text, then answer all questions following each section and on the post test. Check your answers by reviewing the section that each question refers to. This text will be handed in and graded, but the NBC Perception Exercise will be the judge of how much of this information you absorbed.

PURPOSE

This self paced text is designed to teach the Marine officer at this level the U.S. policies on the use of NBC weapons and how to train for survival in an NBC environment. You will learn the basic tasks of identifying different types of agents, and how to react in many different NBC situations. The final portion of the text covers the NBC Warning and Reporting System.

1. **U.S. POLICIES**

a. Nuclear Weapons

(1) United States national policy states that the use of nuclear weapons will be authorized when all conventional means of warfare are severely tested and found to be inadequate, or in response to a threat's first use.

(2) The approval for our initial use of nuclear weapons must come from the President of the United States. Marine units must be highly trained in and well equipped for NBC defense to survive this first attack and subsequent attacks and continue to function effectively in an NBC environment.

b. Biological Weapons

(1) The U.S. will never use biological agents, including toxins, and all other methods of biological warfare under any circumstances.

(2) U.S. biological research will be strictly limited to defensive measures.

c. Chemical Weapons

(1) Lethal or incapacitating chemical agents will not be used first by the U.S. Armed Forces.

(2) The right is reserved to retaliate, using lethal or incapacitating chemical agents, against an enemy force which has used them on U.S. Forces.

(3) The authority to order or approve the first retaliatory strike rests with the President of the United States.

(4) Risk to civilian populations is to be avoided to the maximum extent possible.

QUESTIONS

1. Explain the *U.S. policy on the use of nuclear weapons.*

2. Explain the *U.S. policy on the use of biological weapons*.

3. Explain the *U.S. policy on the use of chemical weapons*.

2. **NUCLEAR WEAPONS**. Explosions, both nuclear and conventional, can be described as resulting from a rapid release of a large amount of energy within a limited space. The size or power of a nuclear weapon is expressed in terms of the yield (or energy released) when it explodes as compared to energy released by an explosion of TNT. Thus, a one-kiloton nuclear weapon is one which produces the same amount of energy in an explosion as does one kiloton (or 1000 tons) of TNT. The explosion of a one megaton weapon yields the equivalent of one million tons (or 1000 kilotons) of TNT.

a. Three Basic Energy Outputs From Nuclear Bursts

(1) Blast

(a) Within microseconds of the detonation of a nuclear weapon in the air the rapid expansion of the fireball, composed of intensely hot gases (tens of millions of degrees), results in air pressure of millions of atmospheres being exerted on the surrounding air molecules. This pressure causes highly compressed dense air to form around the fireball. As the fireball expands this thin shell of high density air (hydrodynamic front) slams into the surrounding air like a piston traveling at the speed of several hundred miles an hours. The surrounding air, in turn, is compressed into a dense, opaque, fast moving "wall" which moves outward from the explosion. The speed at which the blast initially travels as the weapon detonates is seven to eight times that of sound. It rapidly diminishes to approach the speed of sound.

(b) Ground Target Response to Blast Effects. As the blast wave moves outward in all directions it exerts two types of damaging pressures on all material in its path.

1 Static over pressure. The leading edge of the blast wave causes a sudden increase in pressure of relatively short duration. This force, also referred to as peak over pressure, causes damage by completely enveloping a target and squeezing or crushing it from all exposed sides.

2 Dynamic Pressure. Dynamic pressures are the forces associated with the tremendous winds accompanying the blast wave. This pressure causes damage by pushing, tumbling, or tearing apart the target elements.

(2) Thermal radiation

(a) Thermal radiation is the heat and light produced by the nuclear explosion. Because of extremely high initial temperatures at the center of the fireball, the fireball resembles the sun in the respect that a large amount of energy (30-40 percent) is emitted as thermal radiation.

(b) Characteristics of Thermal Radiation.

1 Travels at the speed of light.

2 Travels in a straight line.

3 Can be scattered by dust or smoke particles.

4 Can be reflected from low overhead clouds, water, ice, snow, or sand surfaces thus increasing its intensity.

(3) Nuclear radiation

(a) Initial Nuclear Radiation. Nuclear radiation is emitted by a nuclear explosion within the first minutes after the burst. The components consist of a flow of fission particles and electromagnetic energy such as gamma (X-ray) radiation.

1 Alpha and beta particles are electrically charged particles emitted from the nucleus of radioactive fission products. They have little ability to penetrate and are of little significance unless the emitting fission material comes in contact with the skin, is ingested, or inhaled. The range of an alpha particle is 5 to 15 centimeters and the range of a beta particle is about eight meters from where they land.

2 Gamma rays are a form of pure energy, similar to x-rays. The rate of delivery of initial gamma radiation varies with both the weapon yield and with the distance from the point of burst. The range of gamma rays is approximately 5000 meters.

3 Neutrons are one of the basic components of the nucleus of an atom of fissionable material. Neutrons are released in the initial fission (splitting) and fusion reactions. The range of neutrons after the burst is approximately 3000 meters.

(b) Characteristics of Initial Nuclear Radiation. Both gamma rays and neutrons, although different in character, can travel distances measured in thousands of meters. Additional common characteristics of these two components are:

1 Travel is at about the speed of light. This leaves little time for evasive action except in the case of gamma rays from a megaton-size weapon explosion.

2 It has a high penetrating power. Large amounts of shielding material are required to provide any reasonable degree of protection.

(c) Residual Nuclear Radiation. Nuclear radiation that persists longer than one minute after the burst is called "residual radiation." The primary hazard of residual radiation results from the creation of fallout particles, that is, by the descent of radioactive particles from the column and cloud formed in the explosion. A secondary hazard may arise from neutron induced activity on the earth's surface in the immediate vicinity of the burst point.

(d) Radiation contamination. There are two main ways the earth's surface can become contaminated with radioactive material as a result of a nuclear explosion. Residual radiation can appear on the ground as:

1 Fallout, which is found in a large, irregular pattern encompassing ground zero (GZ) and extending for long distances downwind from the burst point.

2 Induced contamination, which is found within a relatively small circular pattern around the GZ or point of burst.

(e) Electromagnetic pulse (EMP). Although not a basic energy output from a nuclear explosion, the EMP is about one percent of the energy expended from the nuclear blast.

(f) Classification of nuclear burst. There are three kinds of tactical nuclear bursts - air, surface, and subsurface.

1 Air burst. The air burst is a nuclear explosion in which the fireball does not touch the ground. The detonation takes place above the target and blast and heat damage are extensive because a great amount of energy from the explosion is spread over a large area on the ground. Initial nuclear radiation produces casualties among the people who are near the burst. Residual nuclear radiation resulting from an air burst is normally of little or no concern from a military point of view. The radioactive particles will be carried high up into the atmosphere. When they fall back to the earth, they are spread over a large area and produce only a small amount of radiation in any one area. Additionally, the induced radiation pattern is predictable. An air burst nuclear detonation causes the most damage to most military targets.

Because the air burst produces the least radiological contamination it can be used in a tactical military situation to support an attack by troops on an objective. It can be used efficiently on strategic targets such as large cities and industrial areas. This was the type of burst used in Japan, where it was estimated that 60 percent of the total casualties were caused by blast damage, about 25 percent by heat, and 15 percent by initial nuclear radiation. When the air burst is used, the huge ball of fire that is formed radiates heat in all directions for several seconds. The initial nuclear radiation, traveling with the speed of light, does its damage in the first minute after the burst as the cloud rises rapidly. The blast wave, traveling at the speed of sound, arrives after the brilliant flash of light.

2 Surface burst. The surface burst is a nuclear explosion in which the fireball touches the surface of the ground, and the center of the fireball is above the surface of the ground. The effects vary from those of the air burst because much of the energy which would have gone out as blast and thermal energy in an air burst is delivered to the ground. A hole or crater is formed in the ground. The intense heat causes much of the ground to be vaporized and loose dirt and debris mix with the fission products and become highly radioactive. These radioactive particles settle to the earth and become a significant radiation hazard. The area covered by fallout will vary, depending on the winds. The results of a surface detonation, as compared with an air burst, are a reduction of the blast and thermal effects of the nuclear weapon and an increase in the nuclear radiation hazard.

3 Subsurface burst. Underground or underwater nuclear explosions are called subsurface bursts. In either case, as compared to the surface burst, even more of the thermal and blast energy is used up in the ground or water around the immediate vicinity of the burst. There is a strong ground shock wave, similar to a small earthquake, going out from the burst. If the surface is ruptured by the burst, a great amount of material (dirt and rock particles or water vapor) becomes radioactive and falls to the surface in the immediate area of the burst. A huge crater is formed in an underground burst, and the residual nuclear radiation in and near the crater becomes a great danger. The underwater burst may cause great quantities of water and water vapor to be pulled up into the air. As the cloud rises, radioactive mist goes out from the point of detonation, contaminating anything with which it comes in contact. The extent of the blast damage is greatly reduced in subsurface bursts, and the thermal radiation is totally absorbed by the ground or water. Higher radiation intensities of residual nuclear radiation are produced than those from the surface burst, but areas of hazard are usually smaller.

(g) Individual Protective Measures

1 Before. The best defense against a nuclear attack is to dig in. A properly constructed fighting position offers excellent protection against initial and residual radiation because dirt is a good shielding material. A deep

fighting position gives more protection than a shallow one because of the greater thickness of shielding material and the greater reduction of the initial radiation entering the hole. Tunnels, caves, and storm drains also provide good shelters. Culverts and ditches can be used in an emergency. The Marines should be fully clothed when in the open to avoid flash injuries. Any equipment not being worn should be kept in the fighting position. Supplies and equipment should be in covered positions also.

2 During. The first indication of an enemy nuclear attack will be very intense light, much brighter than sunlight. There will be a small amount of time for some protective action, depending on the yield of the weapon and the distance of the burst. Individual defensive actions must therefore be automatic and decisive. Heat and radiation come with the intense light of the explosion, and the blast follows within seconds. Individuals should:

a Move no more than a few steps to seek cover.

b Drop flat on the ground or to the bottom of a fighting position.

c Close their eyes and do not face toward the fireball.

d Protect exposed skin from heat rays as much as possible (put hands and arms near or under the body, and keep helmet on).

e Remain down until after the blast wave has passed and all debris has stopped falling.

Stay calm, check for injury, check weapons and equipment for damage, and prepare to continue the mission.

3 After. Following a nuclear attack, the greatest potential dangers to individual Marines are exposure to fallout or radioactive material from the nuclear cloud and exposure to contaminated terrain. You must:

a Resume communications with leaders and subordinates.

b Dust off uniforms, equipment, and body.

c Assist casualties.

d Clear debris from the area and scrape sides of fighting positions.

QUESTIONS

4. What are the *three basic energy outputs* from a nuclear burst?

   a)

   b)

   c)

5. Define the two damaging pressures associated with ground target response to *blast effect*.

   a)

   b)

6. What are the four characteristics of *thermal radiation*?

   a)

   b)

   c)

   d)

7. Describe *initial nuclear radiation* and *residual nuclear radiation*?

   a) *Initial nuclear radiation* -

   b) *Residual nuclear radiation* -

8. What are the *three types* of *initial nuclear radiation*?

   a)

   b)

   c)

9. *Characteristics* of *initial nuclear radiation* are?

   a)

   b)

10. Two types of *radiation contamination* are?

    a)

    b)

11. Describe the three types of *nuclear bursts*.

    a)

    b)

    c)

12. Explain the *protective measures* for a nuclear attack for the following:

    a) *Before the attack* -

    b) *During the attack* -

    c) *After the attack* -

3. **BIOLOGICAL AGENTS**

a. Definition. Biological agents are defined as living microorganisms that are used in military operations to cause disease among personnel, animals, or plants, and to a lesser extent, deterioration of material.

b. Characteristics of Biological Agents . Perhaps the most apparent consideration for the use of biological techniques in warfare is the relatively great variety of possible agents and the ways in which the human system could be attacked. Biological agents come in a large variety and are extremely easy to produce. The advantages in using biological agents are:

(1) Delayed action effects and lack of warning. This lapse of time is called the incubation period and may last a few days to several weeks, depending on the agent used. There is no way of detecting the agent until the Marine becomes sick.

(2) The reproductive capability of live organisms. A chain of infection from one person to another can easily occur. Troops with respiratory infections can infect others during the incubation period when their own symptoms may be very slight.

(3) Non-persistent lethality producing casualties and then disappearing almost immediately. Botulism for example is a highly fatal disease that can be produced and usually results from eating contaminated canned foods. However, in aerosol form, the toxin is 1000 times more deadly when inhaled. The disease is not contagious but could destroy all human life in a given area within 6 hours. The aerosol itself is vaporized within 12 hours, leaving the ground safe for occupation.

(4) Resistance to the human body's natural defenses. Some biological agents, such as anthrax bacteria, can be developed to resist the body's natural defenses, and remain dormant, but potentially effective, for many years.

(5) Large area of coverage because of the minute dimensions of the microorganism. These weapons have the potential to cover a larger area than other weapons. A very small dose can cause massive numbers of infections. Less than a pound of salmonella typhi, the bacteria that causes typhus, added to a 1.4 million-gallon reservoir would produce 50 million lethal glasses of tap water.

(6) Undetectable size and immediate identification problem on the battlefield. Microorganisms are so small that they have a special measuring unit called a micron which is used to provide dimensions. They can penetrate any fortification that is not airtight and identification can only be accomplished days or weeks after an attack or exposure due to the agent's incubation period.

(7) Reduction of logistical burden in terms of production, storage, transportation, and dissemination. The employment of biological weapons requires less logistical effort than either chemical or nuclear weapons.

c. Dissemination of Biological Agents. Since most biological agents are living organisms, the delivery systems must be capable of disseminating the agent alive and in such a manner that the organisms will spread over the target area. The methods are:

(1) Aerosols delivered by generators, spray tanks or in explosive bomblets.

(2) Vectors - Insects or small animals that transfer disease producing microorganisms to humans through the skin by biting or through open sores.

(3) Sabotage - such as polluting a water source.

d. Passive Defense Against Biological Agents.

(1) Pre-Attack Defense. Pre-attack defenses are the measures taken before the attack and are designed to minimize the effect of the agent on personnel.

(a) Immunization - Requires all Marines to keep their shot records up to date.

(b) Personal hygiene - Requires that all Marines in your unit bathe and shave on a regular basis.

(c) Area sanitation - Have your Marines clean the areas in which they live and work.

(d) Rodent and Pest Control - Stop rodents and other pests from invading your working and living spaces by use of insecticides, delousing, and traps in conjunction with area sanitation.

(2) Defense During the Attack. During the attack the defensive actions are to:

(a) Stop breathing.

(b) Mask and give the alarm.

(c) Cover all exposed skin.

(d) Continue the mission.

(3) Post-Attack Defense. Measures to be followed for post-attack defense:

(a) Shower with hot, soapy water.

(b) Clean equipment with hot, soapy water.

(c) Cook food thoroughly, preferably with boiling water.

(d) Boil all exposed water for at least 15 minutes and use iodine tablets.

(e) Decontaminate and thoroughly clean indoor areas.

(4) Continuous action. These defensive measures should be carried out at all times:

(a) Protect food and water in air-tight containers.

(b) Report all suspicious activity.

(c) Keep the unit informed to avoid rumors which may cause negative psychological effects.

QUESTIONS

13. What are the seven *advantages of using biological agents*?

a)

b)

c)

d)

e)

f)

g)

14. How are biological agents *disseminated*?

a)

b)

c)

15. Describe *passive pre-attack defense* against biological attack.

a)

b)

c)

16. Describe *passive defense during* a biological attack.

a)

b)

c)

d)

17. Describe *passive post attack defensive measures*.

a)

b)

c)

d)

e)

18. What are the *continuous actions* taken to protect against a biological attack?

a)

b)

c)

4. **CHEMICAL AGENTS**. A chemical agent is a solid, liquid, or gas which, through its chemical properties, produces lethal or damaging effects to man, animals, or plants, damages material, produces a screening or signaling smoke, or has an incendiary action. The four standard groups of toxic chemical agents are Nerve , Blister , Blood , and Choking.

a. Nerve agents. Nerve agents are among the deadliest of all toxic chemical agents. Nerve agents may be absorbed through any body surface and in liquid form may rapidly penetrate ordinary clothing or protective clothing. Nerve agents affect the complex electrochemical operation that enables nerves to control muscles. Death usually occurs from paralysis of the diaphragm which makes it impossible for the victim to breathe. If not, the harmful effects of the agent would produce death in any event from cardiac collapse or other similar phenomena. Nerve agents include both G-agents and V-agents.

(1) G-agents. These agents act on the central nervous system of man, interfere with breathing, and cause convulsions, paralysis, and death. G Agents may be used either in vapor or liquid form. In vapor form, the agent may be either inhaled or absorbed through the skin and will produce incapacitation or death.

(2) V-agents. These agents acts on the central nervous system of man, interfere with breathing and cause convulsions, paralysis and death. V-agents will circumvent the protection afforded by the mask. This agent enters through the skin causing delayed casualties.

(3) Symptoms. It is important to know the symptoms for nerve agent poisoning. If a Marine has most or all of the symptoms listed, he must receive first-aid:

- Unexplained runny nose
- Unexplained sudden headache
- Excessive flow of saliva (drooling)
- Tightness in chest (difficult breathing)
- Difficulty seeing (reduced vision)
- Muscular twitching around area of exposed skin
- Stomach cramps
- Nausea

Advanced stages of nerve agent poisoning will consist of most of the above symptoms and include one or more of the following:

- Strange/confused behavior
- Gurgling sounds produced when breathing
- Severely pinpointed pupils
- Red eyes with tears
- Vomiting
- Severe muscular twitching
- Involuntary urination and defecation
- Cessation of breathing

b. Blister agents. Blister agents or vesicants act upon the eyes, lungs, and skin, burning and blistering any part of the body they touch. Blister agents are classified as H-agents and can be disseminated in vapor or liquid form. Examples include mustard (HD), nitrogen mustard (HN), and lewisite (L). Inhaled vapors produce delayed casualties, with the first symptoms occurring about six hours after exposure. Droplets on the skin can disable troops by causing blisters on the skin. Death among troops occurs mainly through secondary infection.

(1) Some blister agents carry a garlic-like odor which may serve as a warning to avoid inhalation of the agent. There is no pain at the time of exposure for many blister agents. The effects on the skin include a rash developing on the face and neck, and areas that are warm and moist such as under the arms and the genital area. This redness gradually becomes brighter, resembling sunburn. By 48 hours after exposure, the reddened skin begins to form blisters possibly several inches across. These may occur anywhere on the body except the palms of the hands.

(2) Symptoms of Blister Agents.

- Nitrogen Mustard - no early symptoms
- Mustard/Lewisite - searing of the eyes and stinging of the skin.
- Phosgene Oxide - irritation of the eyes and nose. Temporary blindness.
- Additional symptoms related to all blister agents include vomiting, diarrhea, blisters on skin and infections.

c. Blood agents. Blood agents produce lethal effects by interfering with the vital process of transferring oxygen from the blood to body tissue. Blood agents are found almost exclusively in vapor form. The two major types of blood agent are hydrocyanic acid (AC), and cyanogen chloride (CK).

(1) Hydrocyanic acid (AC). A colorless, highly volatile, nearly odorless agent which is nonpersistent. The only warning given by AC is the experience of headache, vertigo, and nausea. Convulsions and coma rapidly follow in moderate to high concentration exposure. Violent convulsions follow. Death occurs through paralysis of the respiratory center in the brain which controls the nerves required for breathing and leaves the skin with a pink color.

(2) Cyanogen chloride (CK). A colorless, highly volatile liquid. Its vapor, heavier than air, is very irritating to the eyes and nostrils. CK has a pungent, biting odor, forces crying, and is nonpersistent. The signs and symptoms caused by CK are a combination of those produced by AC and irritation of the lungs.

(3) Additional Symptoms Related to Blood Agents:

- Giddiness (Happiness)
- Nausea
- Headache
- Lips and skin turn pink to red
- Convulsions
- Coma

d. Choking agents. Chemical agents which attack lung tissue, primarily causing pulmonary edema (enlarging of the lungs), are classified as lung irritants. Best known among these are phosgene, chlorine, or chlorine derivatives. The choking gases, first used in cloud form, are the classical agents of chemical warfare. They have a limitation in that their initial irritation or smell immediately warns of their presence, and field protective masks can be donned before lethal exposure.

(1) Choking agents have a highly corrosive effect on the lining of the throat and lungs. Following exposure, the irritated tissues in the lungs exude fluid which fills the lungs with a bloody froth that makes it impossible for the victim to breathe. Death is, in fact, a result of drowning in the victim's own body fluids, or suffocation.

(2) Symptoms of Choking Agents:

- Immediate irritation of the respiratory passages
- Smarting and watering of the eyes
- Violent coughing and retching
- Profuse spitting
- Pulmonary edema

QUESTIONS

19. Define a *chemical agent*.

20. What are the *four types* of chemical agents?

a)

b)

c)

d)

21. Define the two types of *nerve agents*.

a)

b)

22. List the *symptoms* of nerve agents.

a)

b)

c)

d)

e)

f)

g)

h)

23. What are *blister agents*? List some examples.

Blister Agents:

a)

b)

c)

24. List the *symptoms* of blister agents?

a) e)

b) f)

c) g)

d) h)

25. What are *blood agents*? *List* the two major types.

Blood agents:

a)

b)

26. What are the symptoms of *hydrocyanic acid*?

27. What are the symptoms of *cyanogen chloride*?

28. What are *choking agents*?

29. What are the *symptoms* of choking agents?

a)

b)

c)

d)

e)

5. **WARNING AND REPORTING**

a. NBC Warning and Reporting System. Provides a rapid means for disseminating information, but does not possess any inherent security, meaning the information should be passed quickly by the fastest means possible. It is the primary means of warning units of an actual or predicted NBC hazard and is the key in limiting the effects of NBC attacks. The system allows units to determine required protective measures and plan operations. Units may use the reporting system as battlefield intelligence. Speed is more essential than security in reporting attacks of NBC weapons; however, if rapid and secure means of transmitting are available, the senior commander concerned may prescribe their use.

b. NBC Reports. The NBC Warning and Reporting System consists of six reports. The reports of enemy, or unidentified NBC attacks, and the resulting NBC contamination hazard area are made according to the provisions of International Standardization Agreement (STANAG) 2103. The expected chemical and radiological hazardous area resulting from nuclear and chemical attacks by friendly forces is also reported. The reports use standard formats to shorten the messages being passed. The warning and reporting system is based on a code letter system. The meaning and use of each letter used to transmit an NBC message is described on the NBC Warning and Reporting System card..

(1) NBC 1. The NBC 1 report is the most widely used NBC report. The observing unit uses this report to give initial and subsequent data of an enemy nuclear, biological, or chemical attack. All units must be completely familiar with the NBC 1 report format and its information. They must prepare it quickly and accurately and send it to the next higher

headquarters.

The first time a particular type of NBC weapon is used against us , the designated observer unit will send the NBC 1 report with a FLASH precedence. Line items B, D, H, and either C or F should always be reported if the information is known.

(2) NBC 2. This report is based on two or more NBC 1 reports. It is used to pass evaluated data to higher, subordinate and adjacent units. Units use the NBC 2 as a factor in determining whether to adjust MOPP levels (to be discussed in the B5705 class) and to assist in planning future operations.

(3) NBC 3. The NBC 2 report and current wind information is used to predict the downwind hazard area. This is sent to all units that may be affected by the hazard, and therefore is used for immediate warning of expected chemical, biological, or radiological contamination areas. The prediction is safe sided to ensure that there is a high probability that a militarily significant hazard will not exist outside of the predicted hazard area. Commanders should use this report as battlefield intelligence when considering courses of action.

(4) NBC 4. Report used when any unit detects NBC contamination through monitoring or recon. Separate NBC 4 reports are consolidated and then plotted on the map to indicate where the hazard exists. Line items which indicate location of the hazard are used as often as necessary to complete the report.

(5) NBC 5. NBC 4 reports are converted, as necessary, and plotted on a map. From this data a contamination plot overlay map is created. This overlay is sent to all subordinate units. The NBC 5 report is prepared from the contamination plot.

(6) NBC 6. This report summarizes information concerning a chemical or biological attack and is usually prepared at battalion level. It is used as an intelligence tool to help determine enemy future intentions. The NBC 6 report is submitted to higher headquarters only when requested. It is written in narrative form, with as much detail as possible under each line item.

c. Reporting Procedures. All units below division/wing level are designated NBC information sources and are required to collect and report, through the chain of command, information concerning an NBC attack. To be useful, NBC information must be collected, reported, and evaluated. Once evaluated, it can be used as battlefield intelligence. Each commander is responsible for warning subordinate units of NBC hazards resulting from such an attack.

(1) Higher headquarters usually issue a general alert that serves as a guide for subordinate commanders in establishing the Mission Oriented Protective Posture.

(2) Warning of Subordinate Units. After an alert of an NBC attack, all subordinate, attached, and supporting units are immediately warned of the hazard. At company level and below, the chemical or biological attack warning may be through the use of a noisemaker or brevity code by voice, radio, or telephone. The "all clear" normally is given vocally. The actual means are established in the unit's SOP. The warning initiated at company level and above is submitted to the next higher headquarters in the appropriate NBC reporting format using the most appropriate communication means.

d. NBC Information Source. The information source may be a unit under attack or a unit observing an attack. The NBC information source submits reports through command, intelligence, or artillery communication channels, as appropriate, to the designated headquarters combat operation center by the fastest means.

(1) Nuclear Attack Report. The information source, normally headquarters of field artillery or air defense units because of their meteorological and communication capability, submits:

(a) An initial NBC 1 nuclear report to its next higher headquarters with a FLASH message precedence.

(b) Subsequent NBC 1 nuclear reports to its next higher headquarters with an IMMEDIATE message precedence, giving follow-up data.

(2) Chemical and Biological Attack Reports. The information source, normally the headquarters of a company or independent platoon because these are the units most likely to come in contact with a chemical or biological threat, submits:

(a) An initial NBC 1 chemical or biological report to its next higher headquarters with a FLASH message precedence.

(b) Subsequent NBC 1 chemical or biological reports to its next higher headquarters with an IMMEDIATE message precedence, giving follow-up data.

e. Emergency NBC warnings. FMF units use the signals and sounds described to give emergency warnings of NBC hazards. These hazards may include radioactive matter and biological or chemical agents in the vicinity of friendly troops. The alarms are given by means that cannot easily be confused with other signals or sounds normally encountered in combat. They are repeated swiftly throughout the unit by all who hear or see anyone else giving the alarm. The important point here is that everyone gets the word. Units should develop their own SOPs to get the word passed.

(1) Visual signals. The visual signal for chemical or biological hazard consists of putting on the protective mask, extending both arms horizontally sideways with fists doubled facing up, and rapidly moving the fists to the head and back to the horizontal position, repeating as necessary.

(2) Vocal signals. The vocal signal for a chemical or biological spray attack is "SPRAY" and for a chemical attack by other means is "GAS." The vocal alarm for the arrival of radioactive fallout in a unit area is the word "FALLOUT." The protective mask should be put on as soon as attack is detected.

(3) Sound signals. Sound signals may also be used as an emergency warning for an NBC hazard.

(a) Percussion. Rapid and continuous beating on any object that produces a loud noise, such as bells, metal triangles, or empty shell casings.

(b) Horns and sirens. A horn signal of three short blasts, followed by two seconds of silence, with a signal to be repeated for one minute or a siren signal of three long warbling sounds, each separated by a silence are warning signals of NBC hazards.

(4) All clear. The all clear signal, used to indicate that the danger for which an alarm has previously been given no longer exists, will normally be given orally. When circumstances permit, a continuous sustained blast for one minute on a vehicle horn, siren, or similar instrument may be used.

QUESTIONS

30. What is the *NBC Warning and Reporting System*?

31. What is the *NBC 1 Report* used for?

32. What are the *minimum information requirements* for an NBC 1 Initial Report?

a)

b)

c)

33. The *NBC Warning and Reporting System* allows information to be passed. *How*?

34. The *three types of emergency NBC warnings* and *examples* of each are?

a)

b)

c)

35. The *signal for 'ALL CLEAR'* is?

POST TEST

1. Which best describes the policy adopted by the United States concerning biological weapons?

   (a) The right is reserved to retaliate, using lethal or incapacitating chemical agents.

   (b) Biological research will be limited to combat offensive attacks.

   (c) The approval for initial use must come from the President of the United States.

   (d) The U.S. will never use chemical agents under any circumstances.

2. Through its chemical properties, a chemical agent produces:

   (a) Lethal or incapacitating effects to man, animals, or plants.

   (b) A variety of possible agents and the ways in which the human body could be attacked

   (c) Nerve, blood, blister, and choking agents.

   (d) Persistent and non-persistent nerve gases

3. The biological agent dissemination methods are:

   (a) Spray, gas, and liquid.

   (b) Vector, bomblets, and gas.

   (c) Vectors, aerosols, and sabotage.

   (d) Aerosols, sprays, and mists.

4. The three basic energy outputs from a nuclear burst are:

   (a) Subsurface, surface and blast.

   (b) Air burst, surface burst and subsurface burst

(c) Blast, thermal radiation and nuclear radiation

(d) Nuclear radiation, electromagnetic pulse and gamma rays.

5. The standard toxic chemical agents are:

(a) Blood, blister, choking and nerve

(b) H-agents, V-agents, and mustards.

(c) Mustards, phosgene, hydrocyanic acid and lewisite.

(d) Blood, blister, choking and gas.

6. Some symptoms related to blood agents are:

(a) Sudden headache, nausea, red eyes and confused behavior.

(b) Tightness in chest, temporary blindness, diarrhea and stomach cramps

(c) Runny nose, gurgling sounds, headache and blue fingernails.

(d) Headache, violent convulsions, giddiness and coma.

7. Biological agents:

(a) Are living microorganisms that are used in military operations to cause disease among personnel, animals, and some materials.

(b) Are living microorganisms that are used in military operations to cause disease among plants, and to a lesser extent material and pollution.

(c) Do not harm animals of a lower life form.

(d) Do not have any effect on materials, but will harm all living things.

8. The first indication of an enemy nuclear attack will be:

(a) An air raid siren.

(b) Intelligence report.

(c) The blast.

(d) Flash of light.

9. What are the different types of radiation emitted by a nuclear explosion?

(a) Alpha, gamma, beta and electromagnetic.

(b) Electrons, alpha, gamma and neutrons.

(c) Beta, alpha, neutron induced and gamma.

(d) Neutron, gamma, electromagnetic and x-ray.

10. The different phases of defense against a biological agent are:

(a) Passive, present and post.

(b) Pre-attack, passive and during.

(c) During, post and pre-attack.

(d) Post, passive and pre-attack

ANSWERS

1. United States national policy states that the use of Nuclear weapons will be authorized when all conventional means of warfare are severely tested and found to be inadequate, or in response to a Threat's first use.

2. The U.S. will never use biological agents, including toxins, and all other methods of biological warfare, under any circumstances. U.S. biological research will be strictly limited to defensive measures.

3. Lethal or incapacitating chemical agents will not be used first by the U.S. Armed Forces. The right is reserved to retaliate, using lethal or incapacitating chemical agents, against an enemy force which has used them on U.S. Forces. The authority to order or approve the first retaliatory strike rests with the President of the United States. Risk to civilian populations is to be avoided to the maximum extent possible.

4. (a) Blast

(b) Thermal radiation

(c) Nuclear radiation

5. (a) Static Over pressure. The leading edge of the blast wave causes a sudden increase in pressure of relatively short duration. This force, also referred to as peak over pressure, causes damage by completely enveloping a target and squeezing or crushing it from all exposed sides.

(b) Dynamic Pressure. Dynamic pressures are the forces associated with the tremendous winds accompanying the blast wave. This pressure causes damage by pushing, tumbling, or tearing apart the target elements.

6. (a) Travels at the speed of light.

(b) Travels in a straight line.

(c) Can be scattered by dust or smoke particles.

(d) Can be reflected from low overhead clouds, water, ice, snow, or sand surfaces thus increasing its intensity.

7. (a) Initial Nuclear Radiation - Nuclear radiation emitted by a nuclear explosion within the first minutes after the burst. The components consist of a flow of fission particles, and electromagnetic energy such as gamma (X-ray) radiation.

(b) Residual Nuclear Radiation - Nuclear radiation that persists longer than one minute after the burst is called "residual radiation."

8. (a) Alpha and beta particles are electrically charged particles emitted from the nucleus of radioactive fission products.

They have little ability to penetrate and are of little significance unless the emitting fission material comes in contact with the skin, is ingested, or inhaled. The range of an alpha particle is 5 to 15 centimeters and the range of a beta particle is about eight meters from where they land.

(b) Gamma rays are a form of pure energy, similar to x-rays. The rate of delivery of initial gamma radiation varies with both the weapon yield and with the distance from the point of burst. The range of gamma rays is approximately 5000 meters.

(c) Neutrons are one of the basic components of the nucleus of an atom of fissionable material. Neutrons are released in the initial fission (splitting) and fusion reactions. The range of neutrons after the burst is approximately 3000 meters.

9. (a) Travel is at about the speed of light. This leaves little time for evasive action except in the case of gamma rays from a megaton size weapon explosion.

(b) It has a high penetrating power. Large amounts of shielding material are required to provide any reasonable degree of protection.

10. (a) Fallout

(b) Induced contamination

11. (a) Air burst - The air burst is a nuclear explosion in which the fireball does not touch the ground. The detonation takes place above the target, and blast and heat damage are extensive because of a great amount of energy from the explosion is spread over a large area on the ground.

(b) Surface burst. The surface burst is a nuclear explosion in which the fireball touches the surface of the ground, and the center of the fireball is above the surface of the ground.

(c) Subsurface burst. Underground or underwater nuclear explosions are called subsurface bursts.

12. (a) Before. The best defense against a nuclear attack is to dig in. A properly constructed fighting position offers excellent protection against initial and residual radiation because dirt is a good shielding material. A deep fighting position gives more protection than a shallow one because of the greater thickness of shielding material, and the greater reduction of the initial radiation entering the hole. Tunnels, caves, and storm drains also provide good shelters. Culverts and ditches can be used in an emergency. The Marines should be fully clothed when in the open to avoid flash injuries. Any equipment not being worn should be kept in the fighting position. Supplies and equipment should be dug in covered.

(b) During. The first indication of an enemy nuclear attack will be very intense light, much brighter than sunlight. There will be a small amount of time for some protective action, depending on the yield of the weapon and the distance of the burst. Individual defensive actions must therefore be automatic and decisive. Heat and radiation come with the intense light of the explosion, and the blast follows within seconds. Individuals should:

1. Move no more than a few steps to seek cover.

2. Drop flat on the ground or to the bottom of a fighting position.

3. Close their eyes and do not face toward the fireball.

4. Protect exposed skin from heat rays as much as possible (put hands and arms near or under the body, and keep helmet on).

5. Remain down until after the blast wave has passed and all debris have stopped falling.

6. Stay calm, check for injury, check weapon and equipment for damage, and prepare to continue the mission.

(c) After. Following a nuclear attack, the greatest potential dangers to individual Marines are exposure to fallout or radioactive material from the nuclear cloud and exposure to contaminated terrain. You must:

1. Resume communications with leaders and subordinates.

2. Dust off uniforms, equipment, and body.

3. Assist casualties.

4. Clear debris from area and scrape sides of fighting positions.

13. (a) Delayed action effects and lack of warning, this lapse of time is called incubation period and may last a few days to several weeks, depending on the agent used. There is no way of detecting the agent until the troops become sick.

(b) The reproductive capability being live organisms. A chain of infection from one person to another can easily occur. Troops with respiratory infections can infect others during the incubation period when their own symptoms may be very slight.

(c) Non-persistent lethality producing casualties and then disappearing almost immediately. Botulism for example is a highly fatal disease that can be produced and usually results from eating contaminated canned foods. However, in aerosol form, the toxin is 1000 times more deadly when inhaled. The disease is not contagious but could destroy all human life in a given area within six hours. The aerosol itself is vaporized within 12 hours, leaving the ground safe for occupation.

(d) Resistance to the human body's natural defenses. Some biological agents, such as anthrax bacteria, can be developed to resist the body's natural defenses, and remain dormant, but potentially effective, for many years.

(e) Large area of coverage because of the minute dimensions of the microorganism, these weapons have the potential to cover a larger area than other weapons. A very small dose can cause massive amounts of infections. Less than a pound of salmonella typhi, the bacteria that causes typhus, added to a 1.4 million-gallon reservoir would produce 50 million lethal glasses of tap water.

(f) Undetectable size and immediate identification problem on the battlefield. Microorganisms are so small that it has a special measuring unit called micron which is used to provide dimensions. They can penetrate any fortification that is not airtight and identification can only be accomplished days or weeks after an attack or exposure due to the agent's incubation period.

(g) Reduction of logistical burden in terms of production, storage, transportation, and dissemination. The employment of biological weapons requires less logistical effort than either chemical or nuclear weapons.

14. (a) Aerosols delivered by generators, spray tanks or in explosive bomblets.

(b) Vectors - Insects or small animals that transfer disease producing microorganisms to humans through the skin by biting or through open sores.

(c) Sabotage - such as polluting a water source.

15. (a) Immunization - Requires all Marines to keep their shot records up to date.

(b) Personal Hygiene - Requires that all Marines in your unit bathe and shave on a regular basis.

(c) Area Sanitation - Have your Marines clean the areas in which they live and work.

(d) Rodent and Pest Control - Stop rodents and other pests from invading your working and living spaces by use of insecticides, delousing, and traps in conjunction with area sanitation.

16. Defense <u>During the Attack</u>. During the attack the defensive actions are to:

(a) Stop breathing.

(b) Mask and give the alarm.

(c) Cover all exposed skin.

(d) Continue the mission.

17. P<u>ost-Attack Defense</u>. Measures to be followed for post-attack defense:

(a) Showering with hot, soapy water.

(b) Clean equipment with hot, soapy water.

(c) Cook food thoroughly, preferably with boiling water.

(d) Boil all exposed water for at least 15 minutes and use iodine tablets.

(e) Decontaminate and clean thoroughly indoor areas.

18. Continuous Action. These defensive measures should be carried out at all times to include:

(a) Protecting food and water in air-tight containers.

(b) Reporting all suspicious activity.

(c) Keeping the unit informed to avoid rumors which may cause psychological effects.

19. A chemical agent is a solid, liquid, or gas which, through it's chemical properties produces lethal or damaging effects to man, animals, or plants, damages material, produces a screening or signaling smoke, or has incendiary action.

20. (a) Nerve

(b) Blister

(c) Blood

(d) Choking

21. (a) G-Agents - These agents act on the central nervous system of man, interfere with breathing, and cause convulsions, paralysis, and death. They may be used either in vapor or liquid form. In vapor form, the agent may be either inhaled or absorbed through the skin and will produce incapacitation or death.

(b) V-Agents - This agent acts on the central nervous system of man, interferes with breathing and causes convulsions, paralysis and death. V-agents will circumvent the protection afforded by the mask. This agent enters through the skin causing delayed casualties.

22. (a) Unexplained runny nose

(b) Unexplained sudden headache

(c) Excessive flow of saliva (drooling)

(d) Tightness in chest (difficult breathing)

(e) Difficulty seeing (reduced vision)

(f) Muscular twitching around area of exposed skin

(g) Stomach cramps

(h) Nausea

23. Blister agents. Blister agents or vesicants act upon the eyes, lungs, and skin, burning and blistering any part of the body they touch.

Blister agents

(a) Nitrogen Mustard - no early symptoms

(b) Mustard/Lewisite - searing of the eyes and stinging of the skin.

(c) Phosgene Oxide - irritation of the eyes and nose. Temporary blindness.

24. (a) searing of the eyes

(b) stinging of skin

(c) eye and nose irritation

(e) vomiting

(f) diarrhea

(g) blisters on skin

(d) temporary blindness (h) infections

25. Blood agents are toxic agents that produce lethal effects by interfering with the vital process of transferring oxygen from the blood to body tissue.

(a) Hydrocyanic acid (AC)

(b) Cyanogen chloride (CK)

26. The only warning given by AC is the experience of headaches, vertigo, and nausea. Convulsions and coma rapidly follow in moderate to high concentration exposure. Violent convulsions follow. Death is the culminating symptom.

27. The signs and symptoms caused by CK are a combination of those produced by AC and is a lung irritant.

28. Chemical agents which attack lung tissues, primarily causing pulmonary edema (enlarging of the lungs) and are classified as lung irritants or choking agents.

29. (a) Immediate irritation of the respiratory passages

(b) Smarting and watering of the eyes

(c) Violent coughing and retching

(d) Profuse spitting

(e) Pulmonary edema

30. The NBC Warning and Reporting System provides a rapid means for disseminating information, but does not possess any inherent security, meaning the information should be passed quickly by the fastest means possible. It is the primary means of warning units of an actual or predicted NBC hazard and is the key in limiting the effects of NBC attacks.

31. The NBC 1 report is the most widely used NBC report. The observing unit uses this report to give initial and subsequent data of an enemy nuclear, biological, or chemical attack.

32. (a) line Bravo - Location of observer

(b) line Delta - Date-Time-Group

(c) line Hotel - type of agent/height of burst

(d) line Charlie of Fox-trot - location of area attacked

33. The key point of the NBC Warning and Reporting system is that speed is more important than security because of the potential lethality of weapons of mass destruction.

34. (a) Visual signals. The visual signal for chemical or biological hazard consists of putting on the protective mask, extending both arms horizontally sideways with fists doubled facing up, and rapidly moving the fists to the head and back to the horizontal position, repeating as necessary.

(b) Vocal signals. The vocal signal for a chemical or biological spray attack is "SPRAY" and for a chemical attack by other means is "GAS". The vocal alarm for the arrival of radioactive fallout in a unit area is the word "FALLOUT." The protective mask should be put on as soon as attack is detected.

(c) Sound signals. Sound signals may also be used as an emergency warning for an NBC hazard.

(1) Percussion. Rapid and continuous beating on any object that produces a loud noise, such as bells, metal triangles, or empty shell casings.

(2) Horns and Sirens. A horn signal of three short blasts, followed by two seconds of silence, with a signal to be repeated for one minute or a siren signal of three long warbling sounds, each separated by a silence are warning signals of NBC hazards.

35. All Clear. The all clear signal, used to indicate that the danger for which an alarm has previously been given no longer exists, will normally be given orally. When circumstances permit, a continuous sustained blast for one minute on a vehicle horn, siren, or

similar instrument may be used.

Post Test Answers:

1. B
2. A
3. C
4. C
5. A
6. A
7. A
8. D
9. C
10. C

Reference material from which this self paced text was constructed consists of the following:

FMFM 11-1 - NBC Defense Operations in the FMF
FM 3-4 - NBC Protection
FM 3-100 - NBC Operations